As the corresponding table for 1896, on page 488 of the Summary and volume for that year, contained a clerical error the following is to be substituted for it:

Movement of areas of high and low pressures for 1896.

Month.	High areas.				Low areas.			
	By paths.		By days.		By paths.		By days.	
	No.	Movement.	No.	Movement.	No.	Movement.	No.	Movement.
		Miles.		*Miles.*		*Miles.*		*Miles.*
January	10	5,317	45.5	21,880	9	5,435	38.0	21,830
February	7	4,447	34.5	20,260	14	9,931	50.0	23,950
March	8	4,512	39.0	22,460	10	6,693	42.0	26,760
April	6	3,036	26.0	13,430	9	5,098	36.5	20,330
May	7	3,941	33.0	18,520	10	5,075	41.5	19,960
June	7	3,965	44.5	24,470	6	4,620	35.0	20,350
July	7	3,734	22.0	11,990	11	6,302	38.5	22,550
August	6	3,234	29.0	20,950	10	6,617	34.0	23,360
September	7	4,148	30.0	22,900	11	6,631	39.0	24,390
October	10	5,244	44.0	23,530	9	4,832	35.0	18,060
November	5	3,307	22.5	13,810	8	6,491	33.5	25,250
December	8	4,754	32.5	18,390	12	9,171	43.0	31,330
Sums	88	49,639	421.5	231,260	121	76,891	466.0	285,250
Mean daily velocity	564		549		635		612	
Mean hourly velocity	23.5		22.9		26.5		25.5	

TEMPERATURE.

The mean annual temperature at the surface of the ground is approximately shown by the isotherms on Chart I or by the individual figures given in Table I.

The lowest annual averages within the United States were: Williston, 38.8; Moorhead, 39.2; Bismarck and Duluth, 39.5 each.

The highest averages were: Key West, 77.2; Jupiter, 74.1; Tampa, 72.2; Corpus Christi, 70.7; Galveston, 70.2.

The mean annual temperature was above the normal at 101 stations, below at 20, and normal at 12.

The extreme temperatures of the year, or the absolute maxima and minima, are given in Table I and are shown by the isotherms on Chart II. The absolute range of temperature during the year is easily obtained by comparing the full and dotted lines on the same chart.

Maximum temperatures equaling or exceeding 105 occurred at Shreveport, Topeka, Abilene, Phœnix, Yuma, Walla Walla, Redbluff, Sacramento, and Fresno.

Minimum temperatures of —25 or lower occurred at Duluth, Moorhead, Bismarck, Williston, Minneapolis, St. Paul, Huron, and Havre.

The only portions of the country not visited by frost, assuming that frost does not occur with air temperatures above 32°, were the southern end of the peninsula of Florida and the coast line of southern California.

The large annual ranges of temperature were, as usual, in North Dakota and the Northern Slope, viz: Havre, 140°; Bismarck, 138°; Williston, 136; and Moorhead, 129°. The smallest annual ranges were: Key West, 40°; Eureka, 52°; and San Diego, 53°.

The accumulated departures of average monthly temperatures from the normal values are given in Table III. There has been a steadily accumulating deficiency in temperature throughout the Pacific Coast, middle, and southern Plateau regions, amounting to 8° at the end of the year; the northern Slope and North Dakota temperatures also diminished. In other regions there was a steady increase of positive departures, the maximum being in the Gulf and Lake regions.

MOISTURE.

The mean temperature of the dew-point and the mean relative humidity are given in Table I.

The mean temperature of the wet-bulb thermometer has been given for each month, and the average for the year can be easily inferred from Table I, as it is approximately midway between the temperature of the dew-point and the temperature of the air.

The total quantity of moisture in the atmosphere for the current year can be found by the table on pages 539-540 of the Annual Summary for 1894, and does not differ to any important extent from the figures there given for that year.

Evidently, the total rainfall during any year depends upon some other factor than the mere presence of moisture in the air; there is almost always enough moisture present but other conditions may be unfavorable.

PRECIPITATION.

The total fall of rain and melted snow for the calendar year, at regular Weather Bureau and Canadian stations, is presented on Chart III.

In 1894 precipitation was below average in every district east of the Rocky Mountains; in 1895 there was an excess of precipitation in the southern and middle Slopes, but elsewhere between the Rocky Mountains and the Atlantic seaboard there was a marked deficiency. In 1896 there was an excess of rainfall in the extreme Northwest, the upper Mississippi Valley, the Missouri Valley, and the northern and southern Slopes. The year 1897 opened with heavy rains in the lower Mississippi Valley, Tennessee, Alabama, and adjoining regions, and it seemed as if the period of diminished rainfall had come to a close. The rainfall of May was about average, except in the Gulf States, Arkansas, Missouri, and upper Mississippi valleys. The June rainfall was generally below the average, but in July unusually heavy rains fell throughout New England, the upper Lake Region, upper Mississippi Valley, Florida, and portions of the Ohio Valley and the Middle and South Atlantic States. By the middle of August a drought had set in over practically all of the territory east of the Rocky Mountains, which was not broken in some localities until about the 1st of November, and the year ended as one of generally deficient rainfall.

The stations having the largest deficiencies during 1897 are: Galveston, Tex., 19.44 inches; New Orleans, La., 17.05 inches; Raleigh, N. C., 16.94 inches; Wilmington, N. C., 16.66 inches. The stations having the largest excesses are: Jupiter, Fla., 29.09 inches; Fort Canby, Wash., 12.88 inches; New Haven, Conn., 9.98 inches.

The fall of snow for the so-called snow year, namely, from July 1 to June 30, inclusive, is given in the Annual Report of the Chief of the Weather Bureau.

The accumulated departures of the total monthly precipitation from the normal values are shown in Table IV, from which it appears that the total annual precipitation was normal in one district, above the normal in 6, and below in the remaining 14. As in previous years, the greatest deficiency exists in the west Gulf States and lower Mississippi Valley. Precipitation has been below normal in this region since 1890. The deficit during 1897 has been steadily increasing in the Middle and South Atlantic regions, east and west Gulf, upper and lower Lake, Missouri, and upper Mississippi valleys, but a notable excess has accumulated in the Florida Peninsula.

WIND.

The prevailing direction of the wind, namely, that which occurred most frequently at 8 a. m. and 8 p. m., seventy-fifth meridian time, is given in Table I. The annual resultant wind deduced from all the 8 a. m. and 8 p. m. observations of direction, without taking into account the velocity of the wind, is given in Table V; this computation is equivalent to attributing a uniform average velocity to all winds. These resultants are also presented graphically on Chart I, but should be studied in connection with both the lower isobars of Charts I and IV and the upper isobars of Chart V. The relation between the resultant winds thus computed from two observations per day, without regard to velocities and those computed from twenty-four hourly observations, taking full account of the velocities, can be estimated by a comparison between Tables V and VI, pages 544 and 545 of the Summary for 1894.

FREQUENCY OF THUNDERSTORMS.

The successive MONTHLY WEATHER REVIEWS have given for each day and each State the number of thunderstorms reported by both voluntary and regular observers; Tables VI and VII give the annual summary of these monthly tables. In order to ascertain the relative frequency of thunderstorms for the whole country exhaustively, it would be necessary to have at least one special thunderstorm observer for every 20 miles in distance, or every 400 square miles of area. The corresponding number for the respective States is given in the third column of the accompanying Table B. In the absence of such a system of stations, it is proper to divide the number of storms reported by the number of reporting stations in order to deduce the average number per station per annum. The results of this division are given in the eighth column of Table B, which shows that the greatest frequencies per station per annum were: South Carolina, 24.9; Florida, 24.3; Missouri and Tennessee, 22.6; North Carolina, 21.0. The smallest frequencies were: California, 2.6; Washington, 3.9; Oregon, 4.2.

The product of the observed number of thunderstorms by the reduction factors given in column 5 will give the approximate total number of thunderstorms for the whole area of each State.

There were no very severe tornadoes during the year, the one causing the destruction of a portion of the town of Chandler, Okla., on March 30, being the most notable. The year as a whole was remarkably free from violent local storms.

FREQUENCY OF AURORAS.

Tables VIII and IX give a summary of the detailed tables of auroral frequency in the respective MONTHLY WEATHER REVIEWS. The annual numbers are also collected in Table B. In the absence of more precise knowledge it is assumed that the number of observers reporting all auroras is the same as that of those reporting all thunderstorms, and is as given by the estimates published in the fourth column of Table B; the number is, of course, decidedly less than the number of those who report rainfall and temperature.

The total number of auroras reported divided by the number of observing stations for any State gives the relative frequency per station, as shown in the 9th column of Table B, which number is comparable with similar ratios for other parts of the world, provided that the aurora is so low down in the atmosphere as not to be obscured by a cloudy sky. On the other hand, if the auroral light emanates from a region far above the clouds, then a further correction for cloudiness is needed. The average annual cloudiness at 8 p. m., seventy-fifth meridian time, is given in the tenth column of Table B, for regular Weather Bureau stations, but a correction for cloudiness has not been applied in the present case, as the Editor believes that we have no certain proof of the extreme altitude of the aurora, while there are many reasons for believing that the light emanates from the cloud region itself.

The States that reported the greatest frequency of auroras per station were: New Hampshire, 5.93; Maine, 5.67; North Dakota, 5.62; Vermont, 3.91; Montana, 3.00.

TABLE B.—*Frequency of thunderstorms and auroras during* 1897.

State.	Areas in units of 10,000 sq. miles.	Number of stations. Needed.	Number of stations. Reporting.	Reduction factor.	Total for 1897. Thunderstorms.	Total for 1897. Auroras.	Frequency per station. Thunderstorms.	Frequency per station. Auroras.	Annual average cloudiness at 8 p. m., approximate.
Alabama	5.1	128	45	2.8	415	0	9.2	0.00	43
Arizona	11.4	285	30	9.5	320	1	10.7	0.03	35
Arkansas	5.2	130	45	2.9	672	0	14.9	0.00	42
California	15.8	395	115	3.4	298	2	2.6	0.02	35
Colorado	10.4	260	65	4.0	917	8	14.1	0.12	50
Connecticut	0.5	12	15*	0.8	224	13	14.9	0.87	45
Delaware	0.2	5	4	1.2	64	6	16.0	1.50	48
District of Columbia	0.01	0.2	2	0.5	31	0	15.5	0.00	47
Florida	5.9	148	40	4.7	972	0	24.3	0.00	44
Georgia	5.8	145	45	3.2	454	0	10.1	0.00	42
Idaho	8.6	215	30	7.2	290	8	9.7	0.27	60
Illinois	5.5	138	80	1.7	1,378	64	17.2	0.80	52
Indiana	3.4	85	45	1.9	600	7	13.3	0.16	50
Indian Territory	3.1	78	5	15.6	63	0	12.6	0.00	35
Iowa	5.5	138	90	1.5	913	44	10.1	0.49	46
Kansas	8.1	202	65	3.1	748	28	11.5	0.43	38
Kentucky	3.8	95	40	2.4	604	0	15.1	0.00	50
Louisiana	4.1	102	45	2.3	860	0	19.1	0.00	41
Maine	3.5	88	15	5.9	101	85	6.8	5.67	55
Maryland	1.1	28	30	0.9	528	12	17.6	0.40	48
Massachusetts	0.8	20	20*	1.0	253	43	12.6	2.15	51
Michigan	5.6	140	80	1.8	729	103	9.1	1.29	57
Minnesota	8.4	210	60	3.5	699	101	11.6	1.68	52
Mississippi	4.7	118	40	2.8	578	1	14.4	0.25	42
Missouri	6.5	162	80	2.0	1,812	12	22.6	0.15	44
Montana	14.4	360	35	10.3	193	105	5.5	3.00	50
Nebraska	7.6	190	90	2,1	713	28	7.9	0.31	44
Nevada	11.2	280	35	8.0	296	17	8.5	0.49	45
New Hampshire	0.9	22	15*	1.5	174	89	11.6	5.93	55
New Jersey	0.8	20	45	0.4	770	14	17.1	0.31	48
New Mexico	12.1	302	30	10.1	286	0	9.5	0.00	43
New York	4.7	118	70	1.7	717	86	10.2	1.23	55
North Carolina	5.1	128	50	2.2	1,050	0	21.0	0.00	45
North Dakota	7.5	185	40	4.6	245	225	6.1	5.62	47
Ohio	4.0	100	125	0 8	1,680	79	13.4	0.63	55
Oklahoma	3.9	98	20	4.9	161	6	8.0	0.30	40
Oregon	9.5	238	45	5.3	190	4	4.2	0.09	57
Pennsylvania	4.6	115	70	1.6	961	19	13.7	0.27	52
Rhode Island	0.1	2	5	0.4	33	2	6.6	0.40	42
South Carolina	3.4	85	30	2.8	748	1	24.9	0.03	41
South Dakota	7.6	190	45	4.2	296	67	6.6	1.49	52
Tennessee	4.6	115	40	2.9	904	3	22.6	0.08	41
Texas	27.4	685	70	9.1	568	0	8.1	0.00	42
Utah	8.4	210	30	7.0	296	1	9.9	0.03	55
Vermont	1.0	25	12	2.1	178	47	14.8	3.91	58
Virginia	6.1	152	35	4.3	489	0	14.0	0.00	46
Washington	7.0	175	45	3.9	175	36	3.9	0.80	60
West Virginia	2.3	58	30	1.9	317	1	10.6	0.03	50
Wisconsin	5.3	132	55	2.4	617	105	11.2	1.91	54
Wyoming	9.8	245	15	16.4	141	5	9.4	0.33	52

*The values for Connecticut, New Hampshire, and Massachusetts reduced from last year on account of discontinuance of the publication of a number of reports from those States.

SUNSHINE AND CLEAR SKY.

The successive MONTHLY WEATHER REVIEWS have presented in Table XI the percentages of sunshine as recorded by either photographic or thermometric self-registers, as also in Table I, the personal observations and estimates of the average cloudiness from sunrise to sunset. The corresponding chapters in the text have called attention to the systematic differences between the instrumental and the personal records. These differences are doubtless in part due to instrumental and personal peculiarities, such as arise in every kind of exact work; but in addition to these we must consider the fact that the photographic and thermometric registers give the *duration* of certain limiting values of actinic and thermal effects respectively, whereas the personal observations give the percentage of *area* of clear sky. There is no simple relation between these three kinds of data and instead of combining the records indiscriminately we should first investigate the reasons for these differences.

The differences (instrumental minus personal), as given in detail in the tables published from month to month, are collected together in the accompanying Tables C and D for the photographic and thermometric stations, respectively. A cursory examination of these tables shows that there is an annual periodicity by reason of which the differences are larger in the summer than in the winter months. Inasmuch as the average percentage of clear sky is also larger in summer,